## REMARKS

Applicant respectfully traverses and requests reconsideration. Applicant wishes to thank the Examiner for the notice in the Final Office Action dated February 9, 2004 that Claims 5 and 27 are allowed and that Claims 9, 10 and 26 are allowable if rewritten in independent form, including all of the limitations of the base claim and any intervening claims.

Claims 1-3, 6-8, 11-19 and 24 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,686,963 to Uz et al) ("Uz"). Claims 4, 20-23 and 25-27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Uz. Claims 20 and 25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Uz in view of United States Patent No. 5,724,100 to Kuchibhotla "Kuchibhotla". New claims 28 and 29 are supported in the specification at least on page 7 lines 1-3.

**Uz et al.**

Uz is directed to a method for performing rate control in a video encoder that provides a bit budget for each frame while employing virtual buffers and virtual buffer verifiers. (Uz, Title) The rate control algorithm disclosed may be used for constant bit rate and a variable bit rate encoding of video frames. (Uz, Abstract) In some cases, it may be desirable to use variable bit rate (VBR) encoding. In particular, it may be desirable to provide for non-real time variable bit rate encoding. Such encoding may utilize multiple encoding passes.

**Independent Claim 1**

In order to anticipate a claim, the reference must teach every element as arranged in the claim.[1] A portion of Claim 1 recites:

[1] *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990); see M.P.E.P. §2131.

calculating a first quantizer step size such that a first number of bits generated at an output of the constant-bit-rate finite-buffer-size video encoder is constant over a first given number of frames starting at a current frame;

incrementing the current frame; and

calculating a second quantizer step size such that a second number of bits generated at the output of the constant-bit-rate finite-buffer-size video encoder is constant over a second given number of frames starting at the incremented current frame.

The Uz language cited in the Office Action dated February 9, 2004, states:

> To clarify the Examiner's position, please note Col. 11, lines 40 through 47 where an initial quantizer step (default) will allow for X bits to be distributed over an I frame, (or P or B). This meets the limitation of a first quantizer step for a fixed rate over a first given number of frames.

However, the cited portion of Uz states:

> Default values are used to establish budgets for I, P and B frames rather than basing the budgets on the previously coded frame of the same type (citation omitted).

(Uz ¶11, lines 41-47) Therefore, the budget[s] are established so that the budget for an I frame is twice the budget for a P frame and four time[s] the budget fora B frame. The explicit language of Uz as cited does not described establishing a single budget but rather "budgets for I, P and B frames rather than basing the budgets on the previously coded frame of the same type." Therefore, the explicit language of Uz teaches establishing budgets for the I, P and B frames that will be different than the previously coded frame of the same type, and therefore will not be based on "calculating a first quantizer step size such that a first number of bits generated at an output of the constant-bit-rate finite-buffer-size video encoder is constant over a first given number of frames starting at a current frame." Further, Uz explicitly describes that the budgets are established so that the budget for an I frame is twice the budget for a P frame and four times the budget for a B frame rather than "calculating a first quantizer step size such that a first

number of bits generated at an output of the constant-bit-rate finite-buffer-size video encoder is constant over a first given number of frames starting at a current frame."

The Applicant would like to point out the distinction between establishing a budget so that the budget for an I frame is twice the budget for a P frame and four times the budget of a B frame and "calculating a first quantizer step size such that a first number of bits generated at an output of the constant-bit-rate finite-buffer-size video encoder is constant over a first given number of frames starting at a current frame." For example, the cited portion of Uz describes establishing budgets for an I frame that is twice the budget for a P frame and four times the budget of a B frame and as such if an I frame and a P or B frame is transmitted, then the number of bits will actually be different with respect to each other rather than establishing a first number of bits that are constant over a first given number of frames starting at a current frame. The Applicant cannot find where the cited portion of Uz describes maintaining a first number of bits that are constant over a first given number of frames let alone "calculating a first quantizer step size such that a first number of bits generated at an output of the constant-bit-rate finite-buffer-size video encoder is constant over a first given number of frames starting at a current frame." As a result, the Examiner has ignored a principle element of the claims. To the extent the Applicant recites, among other things, "a first number of bits generated at an output of the constant-bit-rate finite-buffer-size video encoder is constant over a first given number of frames," the Applicant's claimed invention is wholly different from the system described in Uz, which, as previously stated, is merely limited to establishing budgets for I, P and B frames.

According to the Advisory Action dated April 16, 2004,

> Again to explain the Examiner's interpretation of Uz, a first Q will produce X bits for the I frame (it does not vary for this given number of frames). Then if Q should be varied, the bit rate will

change for at least the next frame. Therefore the claims are still too broad.

As described above, Uz teaches establishing a budget for only a first frame. Further, the Advisory Action admits that "if Q should be varied, the bit rate will change for at least the next frame." As such, the Office Action acknowledges that Uz fails to teach "calculating a first quantizer step size such that a first number of bits generated at an output of the constant-bit-rate finite-buffer-size video encoder is constant over a first given number of frames starting at a current frame." Further, the assertion in the Advisory Action that "the Examiner's interpretation of Uz [is] a first Q will produce X bits for the I frame (it does not vary for this given number of frames)" is contradicted by the language in Uz as cited, which states "the budget[s] are established so that the budget for an I frame is twice the budget for a P frame and four times the budget of a B frame" and as such the successive transmission of an I, a P or a B frame will result in different bit rates of transmission rather than "calculating a first quantizer step size such that a first number of bits generated at an output of the constant-bit-rate finite-buffer-size video encoder is constant over a first given number of frames starting at a current frame."

The Uz language cited in the Office Action on page 2, which states "the rate control quantization scale factor $Q_n^R$ for an initial macroblock in the first frame of each type (I, P, B) in the new scene, is a function of $TA_i$ and the bit budget for the frame, i.e., $Q_n^R$ = f(bit budget, $TA_i$)" (Uz col. 11, lines 60-64) which is limited to describing a rate control quantization scale factor $Q_n^R$ for an initial macroblock in the first frame of each type (I, P, B) in the new scene rather than "calculating a second quantizer step size such that a second number of bits generated at the output of the constant-bit-rate finite-buffer-size video encoder is constant over a second given number of frames starting at the incremented current frame." The Applicant would like to point out the distinction between the rate control quantization scale factor as a function of $TA_i$

and the limitation, as claimed, of "a second quantizer step size such that a second number of bits ... is constant over a second given number of frames." Nowhere does Uz, as cited describe "a second number of bits ... is constant over a second given number of frames starting at the incremented current frame." Instead, Uz, as cited, merely describes a bit budget only for a *first* frame rather than "a second number of bits ... is constant over a second given number of frames." Consequently, the system described in Uz lacks the advantages of the claimed invention.

As such, since Uz is limited to describing a bit budget for "the first frame" (Uz ¶11, line 62), Uz actually teaches away from among other things the condition "over a second given number of frames." As a result, the Examiner has again ignored a principle element of the claims, namely, "calculating a second quantizer step size such that a second number of bits generated at the output of the constant-bit-rate finite-buffer-size video encoder is constant over a second given number of frames starting at the incremented current frame." As a result, the system described in Uz fails to provide the advantages of the claimed invention, namely avoiding "excessive adjustment of non-intra frames." (Specification page 6, lines 6-7.)

The Applicant submits that the Uz language cited by the Office Action on page 6 regarding claim 1, which states that "the rate control quantization scale factor $Q_n^R$ for an initial macroblock in the first frame of each type (I, P, B) in the new scene is a function of $TA_i$ (average total activity), and the bit budget for the frame, i.e., $Q_n^R = f$ (bit budget, $TA_i$)" (Uz, ¶11 lines 61-64), as previously stated is limited to describing rate control quantization scale factor $Q_n^R$ for an initial macroblock in the first frame, rather than Applicant's claimed subject matter including, among other things, "calculating a first quantizer step size such that a first number of bits generated at an output of the constant-bit-rate finite-buffer-size video encoder is constant over a

first given number of frames starting at a current frame; incrementing the current frame; and calculating a second quantizer step size such that a second number of bits generated at an output of the constant-bit-rate finite-buffer-size video encoder is constant over a second given number of frames starting at the incremented current frame." As such, Applicant submits that Uz neither discloses, teaches nor suggests the applicant's claimed subject matter.

Applicant submits that Uz rather than disclosing "calculating a first quantizer step size over a first given number of frames starting at a current frame; incrementing the current frame; and calculating a second quantizer step size such that a second number of bits is constant over a second given number of frames starting at the incremented current frame," Uz as cited is limited to calculating a rate control quantization scale factor $Q_n^R$ for an initial macroblock in the first frame of each type (I, P, B). Further, to the extent Applicant calculates a first quantizer step size and a second quantizer step size, Applicant claims subject matter that is wholly different than that described in Uz as cited, where Uz describes that a rate control quantization scale factor $Q_n^R$ for an initial macroblock in the first frame of each type is generated. (Uz ¶11, lines 61-62.)

Further, Applicant submits that nowhere does the Office Action specifically point out where Uz describes, among other things, that "a first number of bits is constant over a first given number of frames starting at a current frame; incrementing the current frame" and "a second number of bits is constant over a second given number of frames starting at the incremented current frame." Because Applicant can find no language in Uz that makes reference to "incrementing the current frame," and, further, can also not identify language such that "a first number of bits is constant over a first given number of frames starting at a current frame; incrementing the current frame and such that a second number of bits is constant over a second given number of frames starting at the incremented current frame," Applicant submits that Uz

does not disclose, teach nor suggest Applicant's claimed subject matter. As such, it is respectfully submitted that the Office Action fails to show how Uz describes each and every element as arranged in the claims. Consequently, the Office Action fails to show how Uz anticipates claim 1.

**Claim 2**

According to the Office Action dated February 9, 2004, and also the Advisory Action as described above, the Office Action states that "Note: The examiner's interpretation that a fixed bit for an I frame (default) has the same number of frames (1) as the next I frame is explicitly contradicted by the language in Uz" which states:

> In the second pass, the rate control quantization scale factor is not fixed and is free to vary with virtual buffer fullness. (Uz Col. 22, lines 20-22.)
>
> In the second pass, the rate control quantization scale factor is not necessarily fixed and may vary in response to virtual buffer fullness. (Uz Col. 6, lines 50-53.)

As such, the assertion in the Office Action that the examiner interprets that "a fixed bit for an I frame has the same number of frames as the next I frame" is not supported and further, is contradicted by the explicit language in Uz as cited.

Claim 2 requires "using a second given number of frames that is equal to the first given number of frames." Applicant submits that, as discussed above, Uz nowhere discloses, among other things, "calculating a first quantizer step size such that a first number of bits is constant over a first given number of frames starting at a current frame; incrementing the current frame; and calculating a second quantizer step size such that a second number of bits generated at an output of the constant-bit-rate finite-buffer-size video encoder is constant over a second given number of frames starting at the incremented current frame." Applicant submits that the Uz language cited by the Office Action regarding Claim 2, which states "the number of frames in a

GOP (group of pictures) may be fixed or may be variable," is limited to a number of frames that may be fixed or variable, rather than Applicant's claimed subject matter, including, among other things, "using a second given number of frames that is equal to the first given number of frames." As such, Applicant submits that Uz neither discloses, teaches nor suggests Applicant's claimed subject matter. Applicant respectfully reasserts the arguments made above regarding claim 1. In addition, Applicant also submits that because claim 2 depends from claim 1, and as a dependent claim therefrom, claim 2 is allowable for the reasons claim 1 is allowable. Applicant further submits, argued in part at least immediately above, that claim 2 is also allowable in light of the presence of novel and non-obvious elements contained in claim 2 that are not otherwise present in claim 1.

**Independent Claim 3**

Applicant submits that the Uz language (at col. 12, lines 49-55) cited by the Office Action regarding claim 3, which states "let $S_jQ_j$ be the number of bits and average quantization scale factor used for coding the most recent frame of type j." "Then $BB_i$, the bit budget for frame i is given by," (equation omitted) is limited to the number and average quantization scale factor used for coding the most recent frame of type j", rather than Applicant's claimed subject matter, including "adjusting a number of bits in a second frame based on the power value for the first frame." As such, Applicant submits that Uz neither discloses, teaches nor suggests Applicant's claimed subject matter. Further, to the extent that Applicant "adjusts a number of bits in a second frame based on the power value for the first frame," Applicant's claimed subject matter is wholly different from that described and Uz as cited, where Uz as cited describes a number of bits and average quantization scale factor used for coding.

The Office Action equates calculating a power value to the total activity (TA) in Uz. However, nowhere does Uz as cited at col. 11, lines 61-66 describe the TA as a power value, as

asserted in the Office Action. As a result, Uz fails to describe each and every element as arranged in the claims. Consequently, Uz as cited, fails to anticipate claim 3.

Claim 6

Applicant submits that the Uz language at col. 9, lines 23-27 cited by the Office Action regarding claim 6, which states that "the displaced frame difference activity (DFDA) is the total activity calculated in the manner described above in Section B of the macro block of pixel error values resulting from subtracting the motion compensationed prediction of a macro block from the macro block to be encoded," is limited to the calculation of pixel error, rather than Applicant's claimed subjected matter including, among other things, "calculating a sum of absolute values of the pixel level error values for a pixel block." As such, Applicant submits that Uz neither discloses, suggests nor teaches Applicant's claimed subject matter.

Further, to the extent that Applicant calculates a sum of absolute values, Applicant's subject matters is wholly different than that described in Uz where Uz describes the calculation of the pixel error values resulting from subtracting the motion-compensationed prediction of a macro block from the macro block to the encoded and, as such, does not mention, among other things, the calculation of a absolute value (Uz ¶ 9, lines 23-27). Applicant notes that the Office Action equates the calculated sum of absolute values of the pixel level error with the displaced frame difference activity (DPDA); however, Uz makes no mention of any type of absolute value calculations, as required in the claims.

Applicant submits that the Uz language cited by the Office Action states that the inter-intra decision for the macro block is determined as follows: is limited to the determination if a block is either an inter block or an intra block, rather than "calculating an expected number of bids for the pixel block based on the sum of the absolute values," as stated above. Since Uz as cited fails to describe the calculation of a sum of absolute values of the pixel level error, then Uz

fails to also calculate an expected number of bids for the pixel block based on the sum of the absolute values. As a result, Applicant's claimed subject matter is wholly different than that described in Uz, where Uz describes merely the selection, the determination of whether a macro block is either inter or intra (Uz ¶ 9, lines 38-42).

Applicant, directing the Examiner's attention to Applicant's discussion of Uz above, respectfully submits that Uz nowhere discloses "using the expected number of bits for the pixel block to obtain constant bit rate video encoding." Further, the Office Action's reference to column 12 of Uz makes no mention of "using the expected number of bids for the pixel block to obtain constant bit rate video encoding." Applicant respectfully requests that if the Examiner maintains the rejection of claim 6 based on Uz as cited, the Examiner is requested to show where in column 12 Uz describes "using the expected number of bids for the pixel block to obtain constant bit rate video encoding."

**Dependent Claims 6, 7, 8 and 24**

Applicant respectively reasserts the arguments made above regarding claim 6. Applicant submits that claims 7, 8 and 24 are allowable for at least the same reasons discussed above regarding claim 6. Applicant submits that because claims 7 and 8 depend from claim 6, and as dependent claims therefrom, claim 7 and 8 are allowable for the reasons claim 6 is allowable. Applicant further submits that claims 7and 8 are allowable in light of the presence of novel and nonobvious elements contained in claims 7 and 8 that are not otherwise present in claim 6. As such, Applicant submits that Uz neither discloses, teaches nor suggests Applicant's claimed subject matter.

**Claims 11, 12, 13 and 14**

Applicant submits that the Uz language cited by the Office Action regarding claims 11-14, which states constant bit rate (CBR) rate control is achieved through a feedback

mechanism by monitoring bit spending and appropriately adjusting the quantization step size, is limited to monitoring bit spending and appropriately adjusting the quantization step size, rather than "predicting a relationship between a quantizer scale factor and a number of encoded bits of a pixel block based on a known relationship in previous pixel blocks of a same type." As such, Applicant submits that Uz neither discloses, teaches nor suggests Applicant's claimed subject matter.

Further, to the extent that Applicant predicts a relationship between a quantizer scale factor and a number of encoded bits of a pixel block based on a known relationship in previous pixel blocks of a same type, Applicant's claimed subject matter is wholly different from that described in Uz where Uz describes rate control by monitoring bit spending and adjusting the quantization step size. Further, Applicant submits that nowhere in the Office Action does the examiner specifically point out where Uz describes "predicting a relationship between a quantizer skill factor and a number of encoded bids of a pixel block based on a known relationship in the previous pixel blocks of a same type." Because the Applicant can find no language in Uz, as cited, that makes reference to the above-cited claim language, and further, can also not identify language tying the relationship of the known relationship in previous pixel blocks of a same type. Among other things, Applicant submits that Uz does not disclose, teach or suggest Applicant's claimed subject matter. As such, it is respectively submitted that claims 11-14 are allowable as written.

**Claims 15-18**

Regarding claims 15-18, the Uz language cited in the Office Action states "$C_i(K)$ is the complexity measure for Section K for frame type I" and is limited to a complexity measure rather than "using the group of pictures level prediction, the picture level prediction, and the pixel-block-level prediction to adjust a quantizer scale factor." Applicant submits that the

additional Uz language cited by the Office Action regarding claims 15-18, which states "default values are used to establish budgets for I, P and B frames rather than basing the budgets on the previously coded frame of the same type." The budgets are established so that the budget for an I frame is twice the budget for a P frame and four times the budget for a B frame. The budget for the I frame is determined from factors such as intra-activity and VBV occupancy, and "is limited to establishing budgets for I, P and B frames rather than basing the budgets on the previously coded frame of the same type." As such, the Applicant submits that Uz neither discloses, teaches nor suggests Applicant's claimed subject matter. Applicant respectively requests that the Examiner specifically show where in column 12 that Uz describes "calculating the picture level prediction for the number of bits encoded for the pictures based on a pixel block type."

With respect to claims 16, 17 and 18, Applicant respectfully reasserts the arguments made above regarding claim 15. In addition, Applicant also submits that because claims 16, 17 and 18 depend from claim 15, claims 16, 17 and 18 are allowable for the same reasons that claim 15 is allowable. Applicant further submits, as argued in part at least immediately above, that claims 16, 17 and 18 are allowable in light of the presence of novel and nonobvious elements contained in claims 16, 17 and 18 that are not otherwise present in claim 15.

Applicant submits that the Uz language cited in the Office Action regarding claim 16, which states that "the motion estimation score of a macro block is, for example, a sum of the absolute differences of the pixels in the macro block and the corresponding pixels in the prediction of the macro block in the reference frame" is limited to the sum of the absolute differences of the pixels in the macro block and the corresponding pixels in the prediction, rather than Applicant's claimed subject matter concerning "a sum of absolute values of pixel level error values and a pixel block complexity." As such, Applicant submits that Uz neither discloses,

teaches nor suggests Applicant's claimed subject matter. The Applicant requests that the Examiner clarify the Examiner's assertion that the pixel block complexity corresponds to claim 16, where the Examiner previously asserted that the total activity corresponds to a power value, as shown in the Office Action on page 3, line 1. As such, the Examiner is equating the total activity to two completely different parameters, namely, the power value for one claim and the power value with respect to claim 3, and the pixel block complexity with respect to claim 16.

**Independent Claim 19**

Applicant submits that the Uz language cited by the Office Action regarding claim 19, which states that "a scene change is detected if the deviation from average of $TA_I$ in a particular frame and the deviation from average of the motions estimation score in the particular frame exceed their expected deviations by a threshold factor (example, a factor of 10) a scene change is detected" is limited to detecting a scene change based on the deviation from average of the motion estimation score exceeding a threshold factor rather than Applicant's claimed subject matter "obtaining a scene change indication from a predication error image; and using the scene change indication to reset a global complexity history; and using the global complexity history to provide the rate control for the video encoder." As such, Applicant submits that Uz neither discloses, teaches nor suggests Applicant's claimed subject matter.

**Independent Claim 4**

Claim 4 is rejected under 35 U.S.C. § 103(a) based on Uz. It is well established that to support *prima facie* obviousness, all the claim limitations must be taught or suggested by the prior art. In addition, there must be some teaching, motivation or suggestion in either the prior art, or the references themselves, to make the combination asserted by the Examiner.

The Uz language cited states "the frame activity or field activity for a block is determined by summing the absolute differences of horizontal pixel pairs and vertical pixel pairs." (Uz ¶ 8,

lines 51-53.) However, this cited portion of Uz is limited to calculating frame activity, determined by summing the absolute differences of horizontal pixel pairs and vertical pixel pairs, rather than "calculating a sum of absolute differences between the pixel values in the respective pixel block and the average value."

Accordingly, Applicant cannot find where Uz describes "for each of the plurality of pixel blocks, calculating a sum of absolute differences between the pixel values and their respective pixel block and of the average value; and adding each sum of the absolute differences for each of the plurality of pixel blocks within the first frame to obtain a power value for the first frame." Contrary to the assertion in the Office Action that the cited portion of Uz describes calculating total activities, the cited portion of Uz actually teaches the calculation of frame activity rather than total activity (¶ 8, lines 51-64). In contrast to the Applicant's claimed invention, Applicant cannot find where Uz discloses or makes obvious a method or system relating to calculating a sum of absolute differences between the pixel values and the respective pixel block and to the average value, and adding each sum of the absolute differences for each of the plurality of pixel blocks within the first frame to obtain the power value for the first frame.

In reviewing the Office Action, the Examiner asserts "it would be obvious to one skilled in the art at the time of the invention to calculate the average for each block or each frame as this decision would be based on the required accuracy of the encoder, storage space and computation time."

Case law makes it clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references.[2] Combining prior art references

[2] *In re Dembiczak*, 50 U.S.P.Q.2d 164, 1617 (Fed. Cir. 1999).

without evidence of such a suggestion, teaching or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability – the essence of hindsight.[3] Evidence of a suggestion, teaching or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved, although "the suggestion more often comes from the teachings of the pertinent references."[4] ("The Board must identify specifically ... the reasons one of ordinary skill in the art would have been motivated to select the references and combine them.") The showing of such suggestion, teaching, or motivation must be clear and particular.[5] Broad conclusory statements regarding the teaching of multiple references, standing alone, are not "evidence."

As previously stated, the Examiner asserts that it would have been obvious to one skilled in the art to calculate the average for each block or each frame, as this decision would be based on the required accuracy of the encoder, storage space and computation time. With regard to the Examiner's assertion of the motivation of skilled in the art to modify the system of Uz, a careful examination of Uz as cited reveals that Uz, rather than teaching "calculating a sum of absolute differences between the pixel values and their respective pixel block and the average value." Uz instead teaches calculating a field activity for a block determined by summing the absolute differences of horizontal pixel pairs and vertical pixel pairs. (Uz ¶ 8, lines 51-53.) Rather than

[3] *Id.*; See, e.g., *Interconnect Planning Corp. v. File*, 774 F.2d 1132, 1138, 227 U.S.P.Q. 543, 547 (Fed. Cir. 1985).

[4] *Dembiczak*, 50 U.S.P.Q.2d 164, 1617 (Fed. Cir. 1999); *In re Roffet*, 149 F.3d 1350, 1359, 47 U.S.P.Q.2d 1453, 1459 (Fed. Cir. 1998)

[5] *Dembiczak*, 50 U.S.P.Q. 2d 164, 1617 (Fed. Cir. 1999); See, e.g., *C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d 1340, 1352, 48 U.S.P.Q.2d 1225, 1232 (Fed. Cir. 1998).

teaching the calculating of a sum of absolute differences between the pixel values and the respective pixel block and the average value, Uz teaches summing the absolute differences of horizontal pixel pairs and vertical pixel pairs. As such, Uz teaches merely summing the absolute differences of horizontal pixel pairs and vertical pixel pairs rather than calculating a sum of absolute differences between the pixel values and the respective pixel block and the average value. As such, Uz fails to calculate the difference between the pixel values and the respective pixel block and the average value, as acknowledged in the Office Action.

Additionally, the Examiner provides no rationale or explanation for the assertion that to calculate the average value for each block or each frame, as this decision would be based on the required accuracy of the encoder, storage space and computation time. As previously stated, the motivation to modify Uz must come from the prior art and not from the Applicant's disclosure.

Uz teaches resolving a completely different problem than the claims, since Uz merely teaches calculating frame activity for a block, determined by summing the absolute differences of horizontal pixel pairs and vertical pixel pairs, rather than calculating the power value for the first frame, based on calculating a sum of absolute differences between the pixel values and the respective pixel blocks and the average value, then adding each sum of the absolute differences for each of the plurality of pixel blocks within the first frame to obtain a power value for the first frame. Accordingly, since Uz teaches calculating frame activity for a block determined by summing the absolute differences of horizontal pixel pairs and vertical pixel pairs, Uz teaches away from the claims because the basis of the calculations in Uz are limited to summing the absolute differences of horizontal pixel pairs and vertical pixel pairs, rather than calculating a sum of absolute differences between the pixel values and the respective pixel block and the average value. As such, since Uz teaches away from the claims, one skilled in the art would not

be motivated to modify Uz, as suggested in the Office Action, to perform the power value calculations as claimed.[6]

Accordingly, taken into proper context, Uz teaches the avoidance of the calculation of an average value of the pixel value in each of the plurality of pixel blocks within the first frame because Uz merely teaches calculating the frame activity, rather than the total activity based on the absolute differences of horizontal pixel pairs and vertical pixel pairs. Therefore, taking the teachings of Uz into proper context shows that Uz teaches the mere summing of the absolute differences of horizontal pixel pairs and vertical pixel pairs. Accordingly, not only does Uz teach away from the calculation of the power value, such a modification, as asserted in the Office Action, would change the principle of operation of Uz because it would unnecessarily add complexity to the frame activity determination and increase computation time, rather than provide any benefit with regard to computation time, as asserted in the Office Action (Office Action dated September 24, 2003, p. 5, lines 6-9).

Additionally, one would not have any reasonable expectation of successfully reproducing the claimed invention if so modified. Applicant respectfully submits that the Examiner has misinterpreted Uz, and merely attempted to reconstruct the subject matter in Claim 4 rather than pointing to specific information in Uz that suggests the modification to Uz. Applicant respectfully submits that the Examiner's obviousness analysis is limited to a discussion of the way Uz can be modified to read on the claim, based on motivation obtained from the Applicant's disclosure, rather than from the prior art references themselves. Further, the alleged reference-by-reference and limitation-by-limitation analyses fails to demonstrate how Uz teaches or

[6] A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. (*W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 U.S.P.Q. 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984) M.P.E.P. 2141.02).

suggests the combination to yield the claimed invention. As a result, Applicant submits that the Office Action fails to establish a *prima facia* case of obviousness for the claims.

**Claims 21 and 22**

Additionally, Applicant repeats the relevant remarks above. As acknowledged in the Office Action, Uz does not teach the use of including the method and apparatus, or the use of this method in a constant bit rate finite buffer size video encoder. Further, the Uz language cited states "the result of the first pass and code is a number of bits $B_i$ is limited to calculating a number of bits rather than determining a power value as asserted in the Office Action" (¶ 20, lines 66-67). Additionally, the language cited in Uz describes a feedback mechanism used to account for deviations between $BU_i$ the actual number of bits used to code frame i and $BB_i$ the bit budget for frame i. (Uz ¶ 22, lines 24-26). Rather than teaching "a group-of-pictures-level rate control block, operatively coupled to the processing stage to receive the power value and to provide a target quantizer step size used to provide rate control for the video encoder, Uz instead teaches calculating an actual number of bits used to code a frame.

Since Uz, as cited, fails to describe each claim element as arranged in claim 21, the Office Action fails to establish a *prima facia* case of obviousness. Further, it is asserted in the Office Action, that "it would be obvious to one skilled in the art at the time of the invention to include Uz' variable bit rating coding method using the feedback mechanism to provide a simple constant bit rate video and coding apparatus." Thus, fails to demonstrate sufficient motivation in order to establish a *prima facia* case of obviousness to modify Uz . Further, the combination of the references fail to describe each and every element as arranged in Claim 21. As a result, Applicant submits that the Office Action fails to establish a *prima facia* case of obviousness for claims 21 through 22.

**Dependent Claim 20**

The Office Action acknowledges that Uz does not teach the method of counting a first number of intra-coded pixel blocks in the prediction error image, counting a second number of non-intra-coded pixel blocks in the prediction error image and calculating a ratio of the first number and the second number, comparing the ratio to a threshold to determine a result and using the result as a scene change indication.

The Kuchibhotla language, as cited, teaches that if the predicted macro block is substantially similar to the input macro block, the residuals are relatively small and are easily coded using very few bits (Kuchibhotla, ¶2, lines 36-38), and is thus limited to the discussion of the use of a relatively small number of bits if the predicted macro block is substantially similar to the input macro block. As such, Kuchibhotla fails to describe each and every step as stated above with respect to claim 20. Further, the Kuchibhotla language cited at ¶3, lines 5-67, merely states that "when a scene change occurs, the anchor pictures are substantially different from the current picture, hence the predicted macro blocks are very inaccurate and the residuals are large." (Kuchibhotla, ¶ 3, lines 52-57). As such, neither portion of Kuchibhotla, as cited, teaches each and every element as asserted in the Office Action. As a result, the Office Action again fails to establish a *prima facia* case of obviousness for Claim 20 or for any of the claims.

**Dependent Claims 25 and 26 and Independent Claim 27**

The Office Action acknowledges that Uz fails to teach the determining of intra versus non-intra blocks. Applicant respectfully repeats the relevant remarks made with respect to the above claims. The Applicant asserts that the Office Action fails to establish how the combination of Uz and Kuchibhotla describe each and every element of the claims, as arranged. Furthermore, the Office Action fails to show how Uz and Kuchibhotla describe, among other things, "a prediction error image to determine L1 distances according to sums of absolute

differences; a complexity estimator block coupled to the prediction error image block to determine non-intra pixel block complexity values and intra pixel block complexity values; and a number-of-bit predictor operatively coupled to the prediction error image block to receive the L1 distances and to the complexity estimator block to receive the non-intra pixel block complexity values and the intra pixel block complexity values, the number-of-bit predictor to predict a number of bits generated by the video encoder." Applicant respectfully notes that Claims 25 and 26, dependent upon Claim 24, either directly or indirectly, contain additional patentable non-obvious subject matter and are in proper condition for allowance.

Applicant respectfully requests that the pending claims be allowed to issue. Should the Examiner wish to discuss any aspect of the invention, the Examiner is invited to contact the undersigned at his convenience directly at (312) 609-7970.

Respectfully submitted,

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